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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/733,392	12/07/2000	Richard Alan Haase	0170SS-45347	7432

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EXAMINER	
BARRY, CHESTER T	

ART UNIT	PAPER NUMBER
1724	

DATE MAILED: 08/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/733,392 / 90005710	HAASE, RICHARD ALAN	
	Examiner	Art Unit	
	Chester T. Barry	1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-16,19,22,24-28,33-38,40,41,44-48,51-55,58-61,67-71 and 73-79* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 1-8,10-16,19,22,24-28,33-38,40,41,44-48,51-55,58-61,67-71 and 73-79.

Examiner Comment

Applicant / owner states at page 21 of the response filed 12/16/05 that the term "cationic" has been removed from claim 22. This remark cannot be understood. Claim 22, as filed on 12/16/05 at page 5, twice recites the phrase "cationic polyacrylamide." Clarification of applicant / owner's remark is requested.

Objections to the Specification

Objection is made to the specification because of the following informalities:

The word "mesophilic" is misspelled as "mesophyllic" at col 1 lines 59, 61 and col 2 lines 25, 27; and

The text at col 5 lines 4 – 6 refers to two compounds, i.e., DADMAC and epi-DMA, as "polyquaternary" amines. They are not polymeric.

Appropriate correction is required.

Claim Objections

Objection is made to Claims 1 – 8, 10 - 16 because of the following informalities: In claim 1, the verb "enhance" does not agree in number with the noun "combination." Amendment of "enhance" to "enhances" would overcome this basis for rejection. In claim 15, the verb "is" does not agree in number with the phrase "the polyacrylamide and the polymeric quaternary ammonium compound." Amendment to the phrase, "wherein the polyacrylamide and the polymeric quaternary ammonium compound[s] are

[used] added" would overcome this basis for rejection. Appropriate correction is required.

Note: "polymeric quaternary ammonium compound" and "quaternary polyacrylamide"

Whenever applicant / owner in the original disclosure used the term "polyquaternary amine,"[1] "polymeric quaternary ammonium compound," "polymeric quaternary amine," or the like in connection to his invention, he was referring to the polymers poly(diallyl dimethyl ammonium chloride) or poly(epichlorohydrin dimethyl amine), i.e., poly(DADMAC) or poly(epi-DMA). See, for example, col 1 lines 10-16; and Examples 1 – 3. These polymers were described in connection with only the Method One[2] or the Method Two[3] embodiments of the invention. Never were any of these compounds added to the sludge in Method Three[4] or Method Four[5] embodiments. On the other hand, whenever applicant / owner in the original disclosure used the term "quaternized polyacrylamide," he was referring to a copolymer made from acrylamide and a quaternary ammonium compound, e.g., poly[acrylamide-co-DADMAC] or poly[acrylamide-co-(epi-DMA)] or poly[acrylamide-co-(allyl chloride)].[6] See also Examples 4 – 7.

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[1] Col 3 line 63; col 5 lines 4-38
[2] Col 5 lines 52 – col 6 line 8.
[3] Col 6 lines 9 - 44
[4] Col 6 line 44 – col 7 line 3.
[5] Col 7 lines 4-38
[6] Col 1 lines 20 - 25, col 6 line 47

35 U.S.C. Sec. 251 – Claims Drawn to Non-elected Invention

Claims 74 - 79 are rejected under 35 U.S.C. Sec. 251 as applicant is attempting to reclaim subject matter which was nonelected in the original patent application. The addition of claims in the reissue application which were nonelected in the original patent application is an error which is not correctable by reissue. See MPEP 1412.01.

37 CFR 1.173(b)

The amendment filed December 16, 2005, proposes amendments to claims 1 and 15 that do not comply with 37 CFR 1.173(b), which sets forth the manner of making amendments in reissue applications. Specifically, at claim 1 line 2 (see page 2 of 24 of the 12/16/05 response), in the phrase, "process, comprising:" the comma should be underlined for it does not appear in the original patent claim 1. Further, at claim 15 lines 4-5 (see page 4 of 24 of the 12/16/05 response), the phrase, "is added along with a cationic polyacrylamide; and said polymeric" should appear instead as "is added along with a cationic polyacrylamide[,] ; and said polymeric" because "a cationic" does not appear in the original claim whereas "said" does so appear. A supplemental paper correctly amending the reissue application is required.

35 U.S.C. Sec. 112, second paragraph - essential step missing

The following rejection is predicated on the examiner's construction of "polymeric quaternary ammonium compound" as reading on poly(DADMAC) or poly(epi-DMA) and

not reading on poly[acrylamide-co-(DADMAC)] or poly[acrylamide-co-(epi-DMA)]. See the Note, *supra*.

Claims 33 – 37, 40 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted step is: Contacting the sludge with a polyacrylamide. Claim 33 is directed to a method for dewatering sludge. The claimed method recites only the step of adding to the sludge a polymeric quaternary ammonium compound even though the specification states that each "polyquaternary amine [sic] chemical component used in the chemical method is not large enough to create large enough flocs to dewater the sludge." See also col 5 lines 53-57. Accordingly, any claim that does not recite the addition of both a polymeric quaternary ammonium compound and a polyacrylamide fails to recite an essential step of the process for dewatering sludge.

Claims 34 – 37 are rejected for the same reasons as claim 33 given that none of claims 34 – 37 recites the step of "further comprising adding polyacrylamide to the sludge," or the like. Note that claims 38, 73 are not rejected on the foregoing basis.

35 U.S.C. 112, first paragraph, description

The following rejection is predicated on the examiner's construction of "polymeric quaternary ammonium compound" as reading on poly(DADMAC) or poly(epi-DMA) and ***not*** reading on poly[acrylamide-co-(DADMAC)] or poly[acrylamide-co-(epi-DMA)]. See the Note, *supra*.

Claim 34 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Given the examiner's interpretation that "quaternized polyacrylamide" does not read on poly(DADMAC) or poly(epi-DMA) in this case, see Note, *supra*, the application as filed fails to describe a "polymeric quaternary ammonium compound" having a molecular weight as large as 5,000,000. Only the copolymer, i.e., the "quaternized polyacrylamide," had a molecular weight as large as 5,000,000.[7] The largest "polymeric quaternary ammonium compound" had a molecular weight of only about 3,000,000.[8]

35 U.S.C. 112, first paragraph, description

Claims 48, 51-55, 58 – 61, 78 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure teaches that addition of the "primary component," or the coagulant, e.g., poly(DADMAC) or poly(epi-DMA), forms "microflocs." Upon addition of the polyacrylamide, the microflocs are "bridged" or agglomerated into what applicant describes as "flocs." Nowhere does

[7] Col 7 line 13.

applicant / owner describe the formation of "microflocs" in a sludge composition comprising the flocculent, polyacrylamide.[9] Accordingly, these claims are rejected for reciting a sludge composition comprising microflocs in the presence of both a coagulant (polymeric quaternary ammonium compound) and flocculent (polyacrylamide or quaternized polyacrylamide).

Per claims 55, 58 – 61, the application supports microflocs and flocs, but does not support "an agglomeration of microflocs,"[10] as recited in claim 58. This rejection can be overcome by amending the quoted phrase to "flocs."

Per claim 78, the application fails to describe ***cationic*** polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000. The range of about 5,000,000 to about 15,000,000 describes only anionic polyacrylamide (col 6 line 25). The MW range of cationic polyacrylamide described in the specification was about 5,000,000 to about 16,000,000 (col 5 line 63).

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[8] Col 5 line 60.

[9] The polyquaternary amine components, which create microflocs, are joined in a net and are agglomerated by the polyacrylamides, forming flocs for dewatering. Slower mixing and gentler agglomeration result in optimal size and strength of the flocs. In addition to an increase in size, the combinations of the chemical components affect the physical nature of the flocs. . . . Method one involves the addition of a polyquaternary amine directly to the sludge. Since the polyquaternary amine does not contain enough molecular weight for dewatering of the sludge, once the microflocs of sludge have formed from the polyquaternary amine, a cationic polyacrylamide is added to form a floc that will dewater well. . . . . Method two involves the addition of a polyquaternary amine directly sludge. Since the polyquaternary amine does not contain enough molecular weight dewatering of the sludge, an excess amount of the polyquaternary amine is added so that a noticeable cationic overcharge exists within the microfloc system. This cationic overcharge will exist when the supernatant water is rather clear and the size of the microflocs ceases to grow with chemical addition. (emphasis added)

[10] The use of the term "agglomeration" in the specification was used in the sense of a process of agglomerating microflocs, e.g., "[s]lower mixing and gentler agglomeration result in optimal size and strength of the flocs" The term "agglomeration" was not used as a noun describing a network or bridge of microflocs, e.g., flocs.

35 U.S.C. 112, first paragraph, description

The following rejection is predicated on the examiner's construction of "polymeric quaternary ammonium compound" as reading on poly(DADMAC) or poly(epi-DMA) and ***not*** reading on poly[acrylamide-co-(DADMAC)] or poly[acrylamide-co-(epi-DMA)]. See the Note, *supra*.

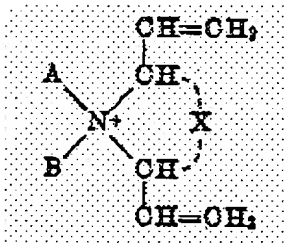
Claim 71 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure fails to describe "polymeric quaternary ammonium compounds" having a molecular weight over about 3,000,000.

35 U.S.C. 112, second paragraph

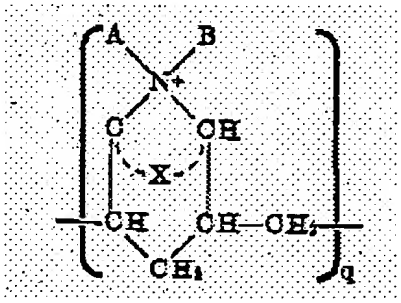
Claims 2 – 3, 44, 51, 58, 68, and 75 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 2 limits the scope of "the polymeric quaternary ammonium compound" to "di-allyl di-methyl ammonium chloride." This recitation is confusing because while a compound may clearly and appropriately be "polymeric," as recited in claim 1, the compound "di-allyl di-methyl ammonium chloride (DADMAC)" is equally clearly not polymeric. This rejection may be overcome by amending claim 2 to read, "wherein the polymeric quaternary ammonium compound[s] is [are from] poly(di-allyl di-methyl ammonium chloride (polyDADMAC) [family]." A

similar rejection applies to claim 3 with respect to epi-DMA not being a polymeric compound. Similar bases apply to claims 44, 51, 58, 68, and 75. Correction is required.

Similarly, Claims 26, 36, 44, 51, 58, 68, 75, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The following abbreviated form of Claim 26 is exemplary of the issue: Claim 26 states, "wherein [the] polymeric quaternary ammonium compound comprises . . . di-allyl di-methyl ammonium chloride." While the polymeric quaternary ammonium compound may comprise mers *derived from* di-allyl di-methyl ammonium chloride, the polymer does not comprise the ammonium chloride compound any more than polyethylene comprises ethane. Compare, for example, the monomer at col 2 lines 10-16 of USP 3288770 to Butler, viz.,



with the polymer at col 2 lines 46-54, viz.,



where A and B are methyl groups and X is chloride. Nowhere in the polymer may one find the monomer at least for the reason that the later bears no allyl groups or carbon-carbon double bonds (other than at the terminal portions of the polymer) while the former conspicuously bears two such groups. Correction is required.

Claims 8, 10-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Per claim 8, the term "cationic overcharge" cannot be understood because the specification does not define this term and there does not appear to be an art-recognized understanding of this term.[11] Claims 10 – 13, all of which depend from claim 8, are rejected for the same reason as claim 8.

Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear whether the "cationic polyacrylamide" recited at claim 15, line 4 is the same polyacrylamide that is recited in claim 1. If so, a clause in claim 15, such as, "wherein said polyacrylamide is cationic, and said polymeric quaternary ammonium compound is added along with said cationic polyacrylamide," or the like, would resolve this lack of clarity.

35 U.S.C. 112, second paragraph

[11] An exhaustive search of the expression "cationic overcharge" in the USPTO text search database, including non-prior art pre-grant publications and prior art US patents, EPO publications, Derwent Abstracts, JPO Abstracts, and IBM Technical Disclosures, as well as a Google engine search (12/21/05) yielded no search results other than applicant / owner's patent '435 at issue as well as CIP 08/721;557

Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 24 requires that "said polymeric quaternary ammonium compound compris[e] a polymeric quaternary ammonium compound" having a specified molecular weight. It is unclear just how many polymeric quaternary ammonium compounds we are dealing with here. Does claim 24 require at least two different polymeric quaternary ammonium compounds, at least one of which meets the molecular weight limitation? Similar rejections apply to the recitations of cationic polyacrylamide. For this rejection to be overcome, it is suggested that claim 24 be amended to read as follows: "The method of claim 22, wherein said polymeric quaternary ammonium compound has a molecular weight in the range of about 500,000 to about 3,000,000 and said cationic polyacrylamide has a molecular weight in the range of about 5,000,000 to about 16,000,000" [sic]."[12]

35 U.S.C. 112, second paragraph

Claims 75 - 77, 79 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Per Claim 75, the claim states, "wherein said quaternized polyacrylamide comprises at least one selected from the group consisting

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(now USP 5906750). The terms "ionic overcharge" and "anionic overcharge" were also searched in this manner, but no results at all were found.

[12] The anionic polyacrylamides have a molecular weight of from about 5,000,000 to about 15,000,000 (col 6 line 23-25). The cationic polyacrylamides have a molecular weight of from about 5,000,000 to about 16,000,000 (col 5 line 62-64).

of . . . " It is unclear what the word 'one" refers to. A compound? A polymer? Amendment to, "wherein said quaternized polyacrylamide is selected from the group consisting of . . . " would overcome this basis for rejection. Per claim 75, even if the claim read, "wherein said quaternized polyacrylamide is selected from the group consisting of di-allyl di-methyl ammonium chloride and epichlorohydrin di-methyl amine," the claim would still be rejected under this section of the statute because neither di-allyl di-methyl ammonium chloride nor epichlorohydrin di-methyl amine is a polyacrylamide. Per claim 76, the phrase, "wherein the concentration of said quaternized polyacrylamide to the percentage of solids in said sludge is . . . " cannot be understood. Was "wherein ***the ratio of*** the concentration of said quaternized polyacrylamide to the percentage of solids in said sludge . . . " intended? Per claim 77, should the quaternized polyacrylamide happen to be a cationic quaternized polyacrylamide, it is unclear whether claim 77 would require the addition of a ***second*** cationic polyacrylamide separate and apart from the cationic quaternized polyacrylamide, or whether claim 77 could be met simply by the addition of the quaternized polyacrylamide to the sludge. Claims 78 – 79 are rejected for the reasons given with respect to claim 77. Additionally, per claim 79, the phrase, "wherein the concentration of said cationic polyacrylamide [sic, "quaternaized polyacrylamide"?] and said cationic polyacrylamide to the percentage of solids in said sludge is . . . " cannot be understood. Was "wherein ***the ratio of*** the concentration of said ***quaternized polyacrylamide*** and said cationic polyacrylamide to the percentage of solids in said sludge . . . " intended?

Eberhard and McGrow

Claims 1 – 2, 4 – 8, 10 - 13, 15 – 16, 19, 22, 24 – 28, 33 - 38, 40, 41, 44 - 48, 51-55, 58- 61, 67 – 71, 73, 75 are rejected under 35 USC Sec. 103(a) over Eberhard (in view of Williams) and McGrow (in view of Reimschuessel and USP 5178774 to Payne).

Eberhard

USP 5019267 to Eberhard at Example 3 (col 5) describes a method for dewatering biological sludge from a "constant 50°C" (col 5 line 58) digestion process. Eberhard describes adding a cationic polymeric flocculent, i.e., Zetag 92, to the biological sludge. As evidenced by USP 5561520 to Williams, Zetag 92 compound is an ultra-high molecular weight polyacrylamide carrying a medium charge density (col 6 line 10).

Example 3 of Eberhard does not describe a sludge from a "thermophilic digestion process," as that term is defined by applicant / owner in his original specification, because 50°C is not "greater than about 55°C" (Haase '435, col. 2 lines 12-14).[13]

[13] "The thermophilic digestion system relies on high operating temperatures (greater than about 55°C. or 131°F) to achieve a substantial pathogen destruction." Haase '435 col 2 lines 12-14. In discussing the prior art, applicant / owner's stating that "when mesophyllic [sic, mesophilic] bacteria are used, digester systems operate between about . . .15°C . . . and about . . . 40°C" (Haase '435 col 1 line 62) would not support the contention, if asserted, that applicant's "thermophilic digestion process" operates at any temperature over 40°C. The art recognizes a gap between the uppermost temperature of the mesophilic range and the lowermost temperature of the thermophilic range. See, for example, Grant & Hackh's Chemical Dictionary wherein mesophilic and thermophilic are defined as describing organisms of optimum growth at 25 – 40°C and 60 – 80°C, respectively. Equally unpersuasive would be the argument that the statement that "[a]t temperatures of at least about 115 °F [i.e., about 46 °C], active bacteria are of the thermophilic variety" (Haase, '435, col 2 line 9) for this statement relates to thermophilic bacteria, not a "thermophilic digestion process."

Eberhard does not describe adding a polymeric quaternary ammonium compound as primary component to the biological sludge. Eberhard does not describe the combination of a polymeric quaternary ammonium compound and a polyacrylamide as enhancing the dewatering of thermophilic sludges.

McGrow

USP 5213693 to McGrow is directed to a sewage-derived (col 1 line 19) sludge dewatering processes. McGrow teaches that when the McGrow application was filed in 1990, it was "standard practice" to facilitate the dewatering of an aqueous suspension by adding coagulant and/or flocculent to it (col 1 lines 5 – 6). McGrow defines a "coagulant" as a highly ionic low molecular weight material that achieves its effect primarily by absorbing onto the surface of the suspended particles and changing the surface charge on them (col 1 line 7). Accordingly, applicant's "primary component" material reads on a coagulant. McGrow explains further that a "flocculent" is a high molecular weight material that achieves its effect primarily by attaching to and bridging between adjacent suspended particles (col 1 line 11).

McGrow describes the use of 0.5 to 5 parts (col 10 line 1) cationic coagulant polymers, such as polydiallyldimethyl ammonium chloride (col 5 lines 40-44) in concert with one part (col 10 line 1) flocculent polymers, such as the Percol 757 product (col 5 lines 45-

48), a copolymer of acrylamide and a quaternary ammonium compound (as shown by Reimschuessel).[14]

McGrow teaches that addition of a solution formed from a blend of bead-form cationic polyDADMAC coagulant, such as Percol 368 brand (col 5 line 43) or Magnafloc 368 (col 7 line 37), and bead-form 90 mole % cationic acrylamide copolymer (col 5 line 55) (col 6 lines 3 – 6) (col 8 line 34) to a municipal sewage sludge gives numerous advantages over addition of a high molecular weight polymeric flocculent alone (col 6 line 30 – 45). The advantages include smaller, evenly structured and highly filterable flocs having good shear stability, a system resistant to overdosing and underdosing, reduced risk of forming gelatinous flocs, drier cake, reduced cycle times, better dewatering equipment capacity utilization, improved filtrate quality, better cake release, and cleaner filter cloths.

Per claims 1, 2, 15, and 16, it would have been obvious to have conducted Eberhard's Example III at thermophilic range temperatures higher than 50°C, say, at about 55 – 60°C, because temperature is a known result-effective variable, nothing in Eberhard teaches away from operating the digestion process at higher temperatures, the skilled artisan would have expected faster pathogen kill and waste degradation rates in view of the Arrhenius equation, and because Eberhard teaches that the prior art had conducted

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[14] USP 4888396 to Reimschuessel discloses that Percol 757 product is a copolymer of acrylamide and acryloxyethyltrimethylammoniun chloride (see note of Table 2, col 16

enzymatic treatment of biomass at temperatures as high as 60°C (Eberhard, col 1 line 54).

Per claims 1, 2, 15, and 16, it would have been obvious to have substituted addition of McGrow's solution prepared from a blend of bead-form cationic polyDADMAC coagulant, such as Percol 368 brand (col 5 line 43), and bead-form 90 mole % acrylamide copolymer (col 5 line 55) (col 6 lines 3 – 6) to Eberhard's thermophilic sludge for the high molecular weight Zetag 92 polyacrylamide flocculent alone, as taught in Eberhard, in order to achieve the numerous advantages of using a coagulant / flocculent solution over addition of traditional polymeric flocculent alone, as taught by McGrow (col 6 lines 30-45).

Per claim 4, the prior art literature in this field suggests that coagulant and flocculant polymers should be dosed sequentially, as shown by McGrow (col 6 line 62). Accordingly, it would have been obvious to have first added McGrow's coagulant to Eberhard's thermophilic digestion process-treated biosludge, allowed for microfloc development, and then added McGrow's polymeric flocculant, as suggested by the prior art literature. The McGrow disclosure as a whole does not constitute a "teaching away" of the invention of claim 4 at least for the reason that the prior art literature expressly suggests sequential addition of coagulant and flocculant, or because the skilled artisan is not compelled to avail himself or herself of certain advantages when an alternative

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line 34).

albeit less advantageous approach is suggested. Alternatively, it would have been obvious at the time the Haase '435 invention at issue was made to have adopted the prior art sequential addition approach in order to avoid infringement of the McGrow patent. Independent claims 1 and 6 of McGrow, for example, each require a step of providing a water-soluble particulate mixture of beads of cationic coagulant polymer and separate beads of cationic flocculant polymer.

Per claims 5 - 6, 27 McGrow describes coagulant: flocculant ratios of 0.5 – 5 (col 10 line 1), i.e., 0.5:1 to 5:1.

Per claims 7, 28, the dosage of polymer added per percent total solids in the sludge is a matter of routine experimentation, so optimization of the same would have been *prima facie* obvious. Besides, McGrow's example of "about 4 kg per ton dry solids sludge" (col 7 line 50) corresponds to about 44 ppm:1% solids.[15] Claim-recited "about 50 ppm : 1% " reads on about 44 ppm:1% solids, as described by McGrow. Furthermore, the range of about 44 ppm:1% solids to about 55 ppm:1% solids is suggested by McGrow's comparison test using 4 – 5 kg polymer (col 7 line 59) so that true side-by-side comparisons can be made.

[15] Assume one ton (2000 lb) dry solids suspended in a 1% solids suspension with 4 kg added polymer. Then polymer concentration would be 4000 g / (454 g/lb) / 200000 lb * 1000000 = about 44 ppm : 1% solids.

Per claim 8, McGrow states that coagulant beads can be added directly to the suspension followed by addition of an anionic flocculent. MrGrow col 4 lines 4 – 13. Additional details about this disclosure are provided by US patent application Ser. No. 546, 435 filed 6/29/90 (now USP 5178774 to Payne et al.). See Payne col. 4 lines 14-24 and Example I, at col 11. Given the disclosure that coagulant polymers are "highly charged," the claim-recited limitation of "cationic overcharge" is inherently described in the disclosure of addition of polyDADMAC or other highly charged coagulant polymer to a suspension.

Per claims 10 and 12, McGrow describes using 10 parts coagulant polymer for each part flocculant polymer (col 5 lines 56-63, especially line 61). Alternatively, per claims 12 and 13, it would have been obvious to have optimized the relative proportion of the coagulant and flocculant because this process parameter is well-known to be result-effective in flocculation processing.

Per claim 11, see col 9 lines 7 – 41, particularly lines 10 – 11, as well as col 6 line 55 of Payne (incorporated by reference into McGrow). Payne teaches using anionic flocculants that are at least 50% anionic. Applicant / owner's claim-recited limitation that the anionic polyacrylamide be "about 40% anionic" reads on Payne's description of the anionic polyacrylamide flocculant that is 50% anionic. Alternatively, it would have been obvious to have varied the mol % of the charged (anionic) monomer in the flocculant

copolymer to optimize dewatering performance because percent charge is a known result-effective variable, as shown by McGrow and Payne.

Eberhard, McGrow, and Sak

Claim 14 is rejected under 35 USC Sec. 103(a) over Eberhard (in view of Williams) and McGrow (in view of Reimschuessel and USP 5178774 to Payne) as applied above with respect to claim 1, further in view of USP 3397139 to Sak. Sak teaches it is conventional to dewater combined primary and secondary sludges. Accordingly, it would have been obvious to have applied to the Eberhard / McGrow process to a combined primary / secondary sludge system, such as the one described by Sak.

Eberhard, McGrow, & Sivakumar

Claim 3 is rejected under 35 USC Sec. 103(a) over Eberhard (in view of Williams) and McGrow (in view of Reimschuessel and USP 5178774 to Payne) as applied above with respect to claim 1, further in view of USP 5413719 to Sivakumar. Sivakumar teaches that two known, functionally equivalent cationic monomers for making cationic polymer coagulants are epi-DMA (col 7 line 1) and DADMAC (col 7 line 20). It would have been obvious, therefore, to have substituted in the McGrow-modified Eberhard method poly(epi-DMA) for the poly(DADMAC) suggested by McGrow.

Carlsson and McGrow

Claims 1 – 2 are rejected under 35 USC Sec. 103(a) over Carlsson in view of McGrow.

Carlsson

USP 4132638 to Carlsson describes a method for dewatering biological sludge ("biosludge" col 8 line 3) from a thermophilic (60°C, col 8 line 27) digestion slurry to which thermophilic inoculation cultures (col 8 line 32) have been added.

Carlsson does not describe adding a polymeric quaternary ammonium compound as primary component to the biological sludge. The patent does not describe adding a polyacrylamide to the biological sludge. The patent does not describe that a combination of a polymeric quaternary ammonium compound and a polyacrylamide enhances dewatering of the sludge. Carlsson does, however, expressly teach that the digested sludge, i.e., the sludge to which thermophilic cultures had been added, be dewatered in "a suitable manner," such as by filtering or flocculation (col 6 line 56). The specific nature or details of a filtering or flocculation dewatering process are not described.

McGrow

USP 5213693 to McGrow is directed to a sewage-derived (col 1 line 19) sludge dewatering processes. McGrow teaches that when the McGrow application was filed in 1990, it was "standard practice" to facilitate the dewatering of an aqueous suspension by adding coagulant and/or flocculent to it (col 1 lines 5 – 6). McGrow defines a "coagulant" as a highly ionic low molecular weight material that achieves its effect

primarily by absorbing onto the surface of the suspended particles and changing the surface charge on them (col 1 line 7). Accordingly, applicant's "primary component" material reads on a coagulant. McGrow explains further that a "flocculent" is a high molecular weight material that achieves its effect primarily by attaching to and bridging between adjacent suspended particles (col 1 line 11).

McGrow describes the addition of a solution prepared from a blend of bead-form cationic polyDADMAC coagulant, such as Percol 368 brand (col 5 line 43), and bead-form 90 mole % acrylamide copolymer (col 5 line 55) (col 6 lines 3 – 6) to a municipal sewage sludge (col 6 line 14) for improved dewatering. Specifically, the use of a single solution prepared from a blend of coagulant polymer and flocculent polymer is ease of use (col 6 line 16). Use of the solution formed from the combined blend gives superior results compared to use of coagulant or flocculant alone (col 6 line 25).

It would have been obvious to have added a solution prepared from a blend of bead-form cationic polyDADMAC coagulant, such as Percol 368 brand (col 5 line 43), and bead-form 90 mole % acrylamide copolymer (col 5 line 55) (col 6 lines 3 – 6) to Carlsson's thermophilic sludge in order to achieve good dewatering performance, as suggested by McGrow.

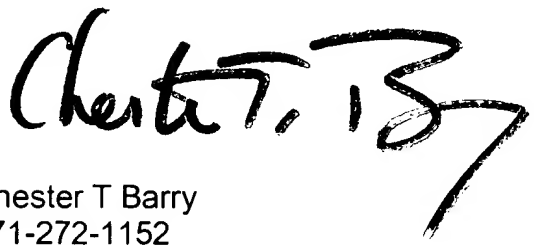
EP 359025 A1 to Eberhard (published Mar. 21, 1990) is cited to show that at least some, if not all, of the subject matter described in Eberhard '267 was publicly known before McGrow's UK priority document was filed in Oct. 1990.

US 5112500 and US 3994806 are cited of interest.

USP 5176748 is cited of interest for stating:

> In one specific example a cationic polyacrylamide, having a molecular weight of from 1 to 5 million, is prepared in emulsified form, by copolymerizing acrylamide with from 3 to 10 mol % of a cationic monomer selected from a list which includes diallyldimethyl ammonium chloride . . .

Respectfully,



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